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Partnerships, Platforms and Policies:

Strengthening Farmer Capacity to Harness Technological Innovation for Agricultural Commericalisation

Key messages

- Human capital and education of women and girls is important – especially youth, who innovate and represent the future of agriculture in Africa. STISA 2024 recognises the need to train young men and women in technology systems beyond the traditional use of mobile phones in agriculture to make agriculture more resilient to climate change.
- Producers' organisations facilitate their members' access to research, technologies, knowledge, markets, financial services and policymaking influence.
- Market mechanisms for farmers can provide strong incentives for innovation.
- Networks and linkages can provide a space for information sharing, negotiation, planning and action in an innovation system.
- An enabling environment for innovation should involve representative producers' organisations in policymaking to take into account farmers' needs.

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Introduction

Innovation capacity presupposes the capacity to harness science, technology and innovation (STI) for agricultural commercialisation. Agricultural commercialisation requires an enabling policy environment on STI issues such as impact of climate change, nutrition, improved seed and inputs, emerging technologies, infrastructure, research and extension, and financing. These issues are consistent with the AU Science, Technology and Innovation Strategy for Africa (STISA) 2024.

This briefing paper[1] uses three STI revolution storylines based on case studies from Ethiopia, Zambia, and Ghana to highlight the enabling factors that make STI a vehicle for agricultural commercialisation. The storylines based on the three case studies were identified considering their relevance to the different types of farming (small-, medium- and large-scale), the importance of commercialisation linked to STI, and the diversity of production systems.

Innovation capacity: the analytical framework

Innovation capacity approach was used as the framework for analysing agricultural innovation/ technology as a vehicle for agricultural commercialisation in Africa.

In this brief, innovation capacity means developing the ability of individuals, organisations and systems to learn, adapt and improve. It involves being creative and joining up knowledge and policies for agricultural commercialisation with farmers being an integral part of the solution for achieving food security and sustainable rural development.

1. **Investing in human capital**
   Human capital is about the knowledge, skills and experience to allow individuals (farmers through to policymakers) to innovate to be economically productive.

1 This brief is based on a longer 2018 APRA working paper of the same title by H. Odame and D. Alemu

So, innovation capacity depends on capabilities of individual receivers and providers of educational and training services.

2. **Investing in social capital**
Strong, effective and inclusive producers' organisations can facilitate members' access to research, extension and advisory services, markets, technologies and financial services. They can also help small-scale farmers gain a voice in policymaking to counter the influence of larger, more powerful interests. Greater understanding is needed on how to foster a culture of collective action and promote innovation-oriented producer organisations. However, prevailing structures often stand in the way of realising the potential contribution of collective action to equitable rural development.

3. **Developing market mechanisms**
Improved access to local or wider markets for inputs and outputs can provide strong innovation incentives. There is need to support development of farmer organisations and cooperatives to mobilise inputs and finance and provide collective marketing at scale. The internet and mobile phones have engendered their ability to innovate, allowing them to participate in value chains, and to engage effectively with other actors in the innovation system such as research institutions, and private and public advisory services.

4. **Building an enabling environment for innovation**
A well-functioning enabling environment creates the conditions necessary at international, national, and local levels for effective innovation processes. The 2012 edition of The State of Food and Agriculture discussed the enabling environment required to foster private investment in agriculture, including by smallholders. This included key issues such as good governance, rule of law, adequate infrastructure and public services, macroeconomic policies, economic incentives, secure property rights, taxation and environmental policies, as well as the importance of supporting small-scale farmers, especially women, in overcoming their constraints to invest in their productive activities. The two key elements of enabling environment for innovation are:

   - **Forging networks and partnerships:** Innovation platforms provide a specific space for information exchange, negotiation, planning and action by bringing different stakeholders together to work towards a common goal. They have been promoted as a practical approach to put the agricultural innovation systems concept into action. The complexity of such platforms means that they need to have a facilitator or intermediary, who can be networked individuals and/or influential organisations, also known as innovation brokers.

   - **Policies to foster innovation:** A national innovation policy provides direction for how to coordinate a wide spectrum of policy domains (including science and technology, education, economic etc), in such a way that together they create an environment that enables and stimulates innovation in the most positive way. The regulatory environment also affects innovation among farmers by setting standards, reducing risks, decreasing the administrative burden and responding to market failures. Innovation policy can help to improve (or simplify) existing regulations that impact on smallholder agricultural commercialisation.

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Rice in Ethiopia: challenging the failure of the green revolution in Africa

Rice was introduced to the Fogera plains in Ethiopia in the 1970s by North Korean researchers. The Fogera plains region was known for serious food insecurity linked with excessive water, which affected indigenous crops production. Since then, rice production has increased considerably, and into more areas, along with adaptation to local consumption tradition. Rice is used as a partial or full substitute for teff (flour) in making enjera (flatbread); its by-products such as straw, husks, and bran are used as animal feed; and rising incomes and a more modern way of life are also propelling a shift in demand towards rice.

Innovation capacity

Rice production and commercialisation in Ethiopia has occurred in three main phases: introduction of rice to Ethiopia (1970–1991); development of rice research (1991–2009), with release of improved rice varieties and demonstration of available technologies; and, since 2010, rice has been recognised in the country's agricultural R&D endeavours through the development of a National Rice Research and Development Strategy and its implementation plans at national and regional levels. The innovation capacity in the transition process over these phases has been very important in the following areas:

The existence of suitable rice ***agro-ecosystems*** was recognised in the early 1990s with the evolution of rice research and extension. More recently, with development of the national strategy, the full potential in terms of area for rice production was estimated to be over 20 million ha, of which 5.6 million were highly suitable.
The role of ***agricultural research and extension*** has been very important, including in rice promotion. In parallel, there were large-scale international, national and government rice production initiatives in the late 1980s. The first variety – Pawe 1 (M-55) – was released in 1998.

A number of ***bridging institutions and organisations*** have contributed to the introduction, expansion of production, processing, marketing, and domestic consumption of rice in Ethiopia. These include formal research on rice as part of the

commercialisation process; technology multiplication of released improved rice seed varieties, through the federal Ethiopian Seed Enterprise, regional seed enterprises and seed cooperatives; and, technology transfer and extension through the Ministry of Agriculture and Natural Resources and members of the national agricultural research system, as well as NGOs (e.g. Sasakawa Global 2000 and MEDA).

MEDA's engagement to empower the domestic rice value chain and promote rice marketing has increased commercial investment in rice production and processing and is sold into national supermarkets. Consequently, rice imports and domestic consumption increased dramatically along with adaptation of rice to domestic recipes and emergence of processors in niche production areas. However, huge imports of rice, combined with increased domestic consumption, led to a considerable decline in the level of self-sufficiency.

National-level networks and linkages are undertaken by the Ministry, with specific monitoring by the National Rice Steering Committee, which ensures improved livelihoods for small-scale rice producers through engagement with relevant actors to promote better access to improved rice technologies, extension services, and market linkages for domestic rice.

General macro policies and rice sector-specific policies have provided the ***policy and enabling environments*** in support of rice sector development. The policy on rice research support has resulted in the establishment of a national Rice Research and Training Centre in 2013. Financial resources have also been allocated from public sources. Moreover, the development of the National Rice R&D Strategy has led to rice being considered a priority crop for large-scale commercial investment, such that a number of foreign and domestic investors have started commercial production.

ICT and mobile phones in Zambia: facilitating market access

Mobile phones are changing the ways Zambians communicate, transact business, make payments, bank, and even travel with more than 65 percent of the population subscribing to various mobile networks. As the telecommunications network expands, 3G networks are introduced, mobile phones and calls become cheaper, and more smartphones are in use, use of mobile phones and internet services also continue to grow. Nevertheless, although the uptake of mobile phones in Zambia is increasing, the number of ICT tools in agriculture is small.

Innovation capacity

An example of an ICT innovation platform in agriculture is the Zambia National Farmers Union (ZNFU) SMS Market and Trading Information Service. The system provides up-to-date market prices and a listing of buyers for major commodities in a cost-effective, accessible and reliable manner. A survey to understand farmers' use and attitudes to the ZNFU's SMS Market and Trading information service found that:

Small-scale traders use the SMS system to find markets for their commodities, determine prices at which they can sell their products, and learn which commodities provide the highest margins. Large-scale traders use the system for procuring produce and discovering prices offered by their competitors. However, few companies send notifications of price changes in real time. It is also expensive for ZNFU to sustain the system since training new users requires more time and resources.

Aside from the output market linkages, the system has incorporated pre-cultivation and cultivation options to a limited extent. These include land planning, crop selection, access to credit and mobile agri-banking, land preparation and sowing, input procurement, supply and management, pest management, e-extension and food traceability. The system has untapped potential to do more to benefit all stages of the product value chain.

Enabling policy environment

The Zambia Information and Communication Technology Authority (ZICTA) is the body responsible for regulating the ICT sector in Zambia. Its vision is to be "The catalyst for a better Zambia transformed through the use of ICT in all sectors of the economy." The country has a national ICT policy but it does not have a specific agricultural sector policy on ICT, although the national ICT policy aims to make the agricultural sector more productive and competitive by applying ICT in planning, implementation, monitoring, and information delivery. Communications and transport policy also supports the use of ICT tools to mainstream women's issues in all economic activities.

Cocoa in Ghana: creating an enabling policy environment

Cocoa is the leading foreign exchange-earning crop for Ghana, which is the second largest producer in the world after Côte d'Ivoire. It contributes about 25 percent annually to the country's total foreign exchange earnings and is also a source of livelihoods for rural farmers and other value chain actors. Cocoa was first developed in Ghana, largely by commercial farmers, many of whom were smallholders and labourers drawing on their own savings and labour, in response to market opportunities and the development of infrastructure.

The crop has gone through four key innovation phases in Ghana since its introduction: exponential growth (1888–1937); stagnation and growth post-independence (1938–1964); downturn (1964–1982); and recovery and second expansion (1983–2008). These four phases provide a foundation for STI, which plays a critical role in the success of the cocoa value chain in Ghana. These phases briefly provide a background for cocoa production, which has five main components of innovation capacity in commercialisation of cocoa in Ghana: research and extension, farmer organisations, networks and linkages, marketing, and an enabling environment.

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Case study: innovative marketing

CAA and KKFU have an innovative approach to trading. They obtained certification for fair trading in cocoa, which provides an opportunity for a more structured and direct relationship with Dutch buyers. Group members are trained to build their capacity and organise. After one year, trained farmers apply for certification, which brings a better price and the buyers and service providers involved in certification become the supply chain managers. CAA and KKFU provide services and inputs to farmer groups, linking farmers to their organisation and creating a kind of parallel vertical value chain.

Innovation capacity

Various actors play important roles in the innovation system. Six key building blocks are identified for sustainable sectoral transformation:

Farmers and their changing ***farming ecosystem*** were the main drivers of innovation in the introduction and development of cocoa in Ghana but, with insufficient money with which to buy land, new farmers practised sharecropping with earlier settlers under a system called abusa, in which labourers were paid one-third of the sales price of the harvested cocoa. Cocoa farmers reinvested profits in cocoa production and rapidly expanded the production frontier into new regions, and consolidating Ghana as the leading world producer (1910–1914). In the 1940s, outbreaks of pests and diseases reduced production in the Eastern region, pushing cocoa cultivation further into the western frontier. Farmers used local knowledge and market mechanisms to expand cocoa production.

Research education and extension plays a key role in the generation and use of new knowledge. The Cocoa Research Institute of Ghana (CRIG), which operates under the Cocoa Marketing Board (COCOBOD), is the key centre for new knowledge. CRIG has generated various innovations including introducing high-yielding cocoa tree varieties and encouraging farmers to replace the trees infected with cocoa swollen shoot virus and improve productivity, which increased from 210 kg to 404 kg per hectare.

Transforming a sector in a sustainable manner requires ***effective producer organisations*** for service and product markets. In Ghana, about 25 percent of producers (200,000) are organised in some way. Increasingly, cocoa farmers are being encouraged to organise themselves in groups as a prerequisite for certification and for accessing technical and business training, extension and inputs on credit.

Two formal cocoa farmer groups exist: Cocoa Abrabopa (CAA) and Kuapa Kokoo Farmers' Union (KKFU) – see case study box. Other small groups are organised around a particular need (viz. exchange of labour, access to certification and access to credit). Various institutional and product/ process innovations put in place have therefore enabled the transformation and revitalisation of ***cocoa marketing*** in Ghana in recent years. In 1965, the world cocoa price collapsed, resulting in inflation and a drop in the real producer price in Ghana due to heavy overvaluation of the currency. During 1983-2008, the Cocoa Rehabilitation Project influenced a change of policy to increase farm gate prices paid to Ghanaian farmers relative to neighbouring countries. Licensed buying companies (LBCs) also reduced the monopoly of produce buying companies (PBCs), which previously bought all cocoa produced by farmers.

Various networks and linkages play an important role in cocoa in Ghana. In particular, COCOBOD plays a dominant role across the cocoa value chain, as it supplies inputs to farmers and the PBCs to enable farmers to sell their produce at guaranteed prices. LBCs and the processing, transportation, and trucking components of the value chain are also very important in the industry. COCOBOD's quality control division has also assisted farmers in adopting good agricultural practices to optimise yields, control diseases and pests, and maintain good seed. The quality control division also encourages links with enterprises, especially in relation to products destined for supermarkets and export markets.

The cocoa sector in Ghana has ***strong governance and policy*** support with clear policies and regulations to guide all actors and actions, from production to marketing. Established in 1947, COCOBOD was mandated with a monopoly of purchasing cocoa until the policy reforms (1990s and 2000s), which led to more efficient public institutions and opened space for enhanced private sector participation in the industry and enabled effective competition. Other market mechanisms including fair trade have emerged, while corporate social responsibility and human (child) rights issues offer good opportunities for niche markets and create opportunities for further innovation. These policy reforms and market stimuli have enabled a greater share of the cocoa price to be passed on to cocoa farmers in Ghana.

Conclusions and recommendations

4.1 Challenging the failure of the green revolution in Africa

- Although recently introduced to Ethiopia, demand for rice has stimulated a considerable increase in domestic production, along with huge imports. The role of STI has been considerable, including identifying Ethiopia's production potential to testing and promoting improved rice technologies, and empowering different actors in the rice value chain.

- Nevertheless, the steady decline in self-sufficiency and the limited exploitation of existing production potential provide an opportunity to enhance the contribution of STI for rice sector development in Ethiopia, including in: global engagement in rice STI, as rice is a global crop with state of the art technologies in various nations, especially in Asian countries; enhancing domestic innovation through increased extension services; and further empowering the domestic rice value chain, especially in value addition so that domestic rice can compete with imported rice.

4.2 Facilitating market access

- The mobile platform developed in Zambia has been seen as an innovative way to transform agribusiness because it offers a wide range of solutions at various levels of the agricultural value chain. More work needs to be done to tap into the potential of mobile technology in the input market components (including seed, fertiliser, agro-chemicals).

- There is a need to develop: a specific agricultural sector policy and programmes on ICT that focus on smallholder farmers; real-time updates on critical

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changes that inform decision-making; ICT models to address tailored gender needs; evaluation on quality, impact and lessons learned from ICT use; and sustainability of ICTs beyond funding for specific projects.

4.3 Creating an enabling policy environment

- Research has led to high-yielding cocoa varieties and farming technologies but weak institutional synergy and strategy have limited innovation.
- Farmer organisations and civil society organisations have influenced reforms in the cocoa sector, thus reducing public and private control, but this is yet to lead to a sustainable governance system with strong farmer entrepreneurship.
- Cocoa marketing has focused on beans for export yet there is potential for expansion into niche markets and domestic consumption of cocoa products through investment in research and policy on value addition.
- While COCOBOD facilitates linkages with the critical actors in the cocoa value chain, there is greater potential for stronger linkages and networks among processing companies for joint strategies; and between scientific institutions and processing companies to facilitate innovations in the cocoa sector.
- Policy reforms in Ghana's cocoa sector have allowed better world cocoa prices to be passed to producers. But there is potential for greater innovation by implementing existing and new policy actions on local cocoa consumption; support for the cocoa value chain; good manufacturing practices and quality standards (including attractive product packaging); and regulation of cocoa products such as chocolate exported to Europe.

This brief recommends the following areas for future research in response to the methodology of pathways of a technological innovation (with respect to rice, ICT and cocoa) that lead to agricultural commercialisation:

- How is STI enabling commercialisation of agricultural value chains to have positive impacts on rural poverty, women's and girls' empowerment, and food and nutrition security?
- What are the specific contributions of the different domains of innovation capacity in promoting agricultural commercialisation?
- What is the role of STI in promoting non-farm rural economies and rural–urban linkages?
- What attention should be given to youth in agriculture?

Image captions:

Cover – Two farmers using a mobile phone

Page 2 – Farmers harvest teff by hand near Negele, Ethiopia.

Page 3 – Asante Bismark and Dwomoh Kwasi spread cocoa beans for drying in Kyekyewere, Ghana.

Page 5 – An extension worker explains the use of digital technology to Nafisa Iddrisu, for use on her farm.

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